THE DATA COLLECTION SYSTEM AUTOMATIC PROCESSING SYSTEM (DAPS)

DOMESTIC SATELLITE (DOMSAT) RECEIVE ONLY TERMINAL (DROT) USER INTERFACE MANUAL
VERSION 3.0

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1. INTRODUCTION

This document provides the users of the Domestic Satellite (DOMSAT) Receive-Only Terminal (DROT) with all information necessary to install, use, and maintain the system hardware and software. Section 1 provides an overview of the DROT purpose and functions. Section 2 describes the hardware setup and software installation for the DROT. Section 3 describes how to use all of the features of the DROT. Section 4 describes various maintenance and configuration tasks performed on the DROT. Section 5 contains various scenarios for performing combined tasks on the DROT.

1.1. Overview

The National Environmental Satellite, Data, and Information Service (NESDIS) manages, operates and maintains the U.S. Geostationary Operational Environmental Satellite (GOES) system. The GOES system's primary mission is to continuously observe changing weather phenomena from satellite based sensors situated approximately 23,000 miles from Earth. As a collateral duty, the GOES system supports a radio relay or Data Collection System (DCS). The DCS enables a large variety of environmental data to be relayed from point sources, Data Collection Platforms (DCP), which are land, sea, or mobile based through GOES and back to Earth, from where these data are disseminated to the various system users.

The DCS Automated Processing System (DAPS) was developed for the National Oceanic and Atmospheric Administration (NOAA) to support the increased volume and complexity of the DCS since its inception. The DAPS supports the receipt of messages from up to 100,000 platforms and can redistribute them to up to 5,000 users.

The primary means of data dissemination on the old DCS were telephone circuits. In the new DAPS this has been changed to a leased channel on a domestic communications satellite (DOMSAT). The DAPS is located at the NOAA Command and Data Acquisition CDA) facility at Wallops Island, Virginia. From here platform messages are continuously broadcast using a subset of the X.25 protocol at 56,000 bits per second (56 Kbps). The data stream is received by the DOMSAT Quality Monitor (DQM), also at Wallops, where it is checked for completeness and transmission quality. The DQM will inform the DAPS of messages containing transmission errors so they can be automatically scheduled for retransmission.

Most users of the DCS will have a PC-based receiving station consisting of a satellite antenna, an industry-standard 386/PC running the UNIX(1) operating system, and custom software provided by the government. This receiving station is called the DOMSAT Receive Only Terminal (DROT). Figure 1-1 illustrates the data path from the DCP to the user's DROT.

The DROT is designed for continuous operation. It can selectively archive messages from up to 1,600 platforms specified by the user. The amount of disk storage used by the DROT can be configured by individual users depending upon their local requirements and capacities. The default at installation is 20 million bytes, which should hold several days-worth under normal operation. While data is being received, the user can search for desired messages based on a variety of criteria such as time of arrival, originating platform, etc. Desired messages can then be displayed on the CRT screen, printed, saved to separate storage on the hard (or floppy) disk, or transmitted to a local host via a serial line.

(1) UNIX is a registered trademark of Microsoft Corporation

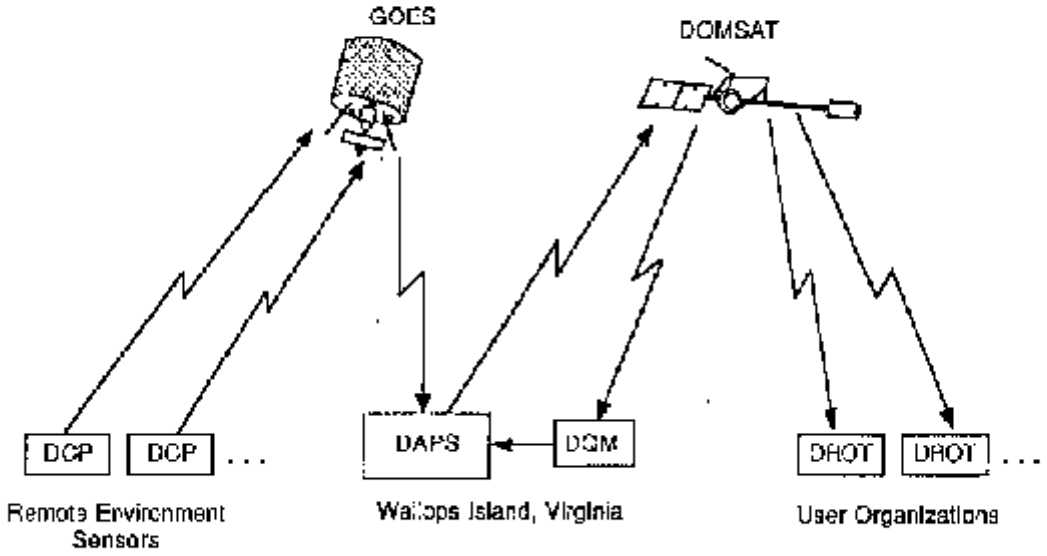

FIGURE 1-1: DATA PATH FROM DCP TO USER

Many users have their own local processing facilities hence the DROT will be used primarily as a front-end filter/translator to selectively extract desired messages and forward them to another computer via a serial line. This can be done in realtime (as the messages are received), or manually at periodic intervals. To do this manually the user will use the non-realtime features of the DROT to search for any new DCP messages which may have arrived, and then to display, print, save-to-disk, or forward these messages via the serial line.

2. INSTALLATION

This section describes the steps needed to set up and test the DROT components. The minimum hardware requirements for running the DROT are listed in appendix A. In the remainder of this chapter the hardware setup and diagnostics are described. Then an overview of the SCO UNIX installation process is given. Finally the installation of the custom DROT software is described.

2.1 Hardware Setup and Diagnostics

First set up the industry-standard 386 PC, monitor, keyboard, and printer according to the manufacturer's instructions. Power the system up and perform whatever hardware diagnostics were provided (There is usually a floppy disk labeled "System Checking" or "Diagnostic Checking" or something similar). There may also be separate diagnostic disks provided with the printer and video adapter.

Unpack the Franklin ICP188C communications board. The board should come with a loop-back connector and a floppy disk labeled "ICP188C Diagnostics, Version 2.42". Write down the serial number of the ICP188C board about to be installed. It will be used later during the diagnostic checking.

Generally the board should function properly with the factory default jumper settings. Specifically, jumper pins 3-4,2-5, and 1-6 on jumper J2. This sets the base I/O address to 278H.
The software configures the board to use a 64KB shared memory window starting at segment D000H. This is not currently configurable. This does not cause a problem on most standard 386 PC systems. However, if other third-party boards such as multi- port serial boards, ethernet adapters or other communications processors are used on the DROT, care should be taken to make sure there is no address conflict.

No interrupts are used for the ICP188C in the DROT software.

Read the computer manufacturer's instructions on installing expansion cards. Open the PC and install the ICP188C in any of the 8 or 16 bit bus slots on the PC mother-board. Attach the loop-back connector to the 37-pin socket on the back of the ICP188C.

Also, while the PC case is open, see if there is a 'fault map' taped to the hard disk. If so, take it out. The fault map contains a list of bad tracks that the manufacturer found on your hard disk. This will be needed later when installing the SCO UNIX Operating System.

Boot MS-DOS on the PC and then place the Franklin diagnostic disk in the floppy drive and run them by typing:

a:
runme

The program will offer a menu of four items, choose "**1. Run Diagnostic Tests**". You are then queried for the serial number(s) of up to four ICP188C boards which are installed. Type in the serial number of the ICP188C installed in this PC after the query for "Board 0". After the queries for other boards, just press **ENTER**.

Finally you are offered a menu of several tests which can be performed. Choose "**A - Test All Functions**". The tests should complete without reporting any errors. If errors are reported in the SCC Loopback or RS232 Signal tests, check that the jumpers are set in the proper positions given above and that the loop-

back connector is securely fastened to the 37-pin socket on the back.

When the tests are complete, press **X** to exit the diagnostic program, then select option 4 to return to DOS. Remove the loop- back connector and store it in a safe place.

Set up the satellite antenna and interface (TBD). Connect the RS-232 antenna interface to the 37-pin socket on the back of the ICP188C.

2.2 SCO UNIX System V/386 Installation

If UNIX is being installed for the first time on your system, follow the installation instructions detailed in Chapter 2, Installation Guide, of the System Administrator's Reference. If the computer has been previously used for MS-DOS, first backup anything on the hard disk that you want to save. The UNIX Installation will destroy the entire contents of the hard disk.

There are two installation options: "Automatic" and "Configurable". Generally, you may choose the "Automatic" installation option, however if you intend to install other software or hardware products besides the DROT you may have to proceed through the "Configurable" installation. When using the "Automatic" installation all default values are acceptable. It is not recommended that a separate (/u) filesystem be created. It is recommended that the "Relaxed Security" option be selected.

2.3 DROT Software Installation

UNIX provides a menu-driven utility for managing the system called '**sysadmsh**'. This utility must be run to create the drot user account and install the DROT software. To run this utility login as root, giving the password that you supplied during the UNIX installation. When you get the shell prompt (#), type '**sysadmsh**' and press **Enter**.

First create the drot account by selecting **Accounts** from the first menu; **User** from the second menu; then **Create** from the third menu. Enter 'drot' for the username, any comments you desire and select 'yes' for 'Modify defaults' prompt which will bring up a new menu. The only default that must be modified is the Login Shell option. Specify 'csh' for that option. Press **Enter** to accept all other defaults when prompted. Upon exit of the default modification menu, you will be prompted for a password for the drot account which will complete the creation of the drot account. Additional information on setting up and administering user accounts may be found in the "Administering User Accounts" chapter of the System Administrator's Guide.

After creating the 'drot' account, use the **Esc** key to return to the main menu of **sysadmsh**. To install the DROT software, select **System** from the main menu; **Software** from the next menu; then **Install** from the last menu. Press **Enter** to select **A New Product**, then **Enter** again to select the **Entire Product**. Place installation disk #1 in the disk drive and press **Enter** when prompted. When you are prompted for the first distribution volume just press **Enter**. The installation script will install the DROT software and the driver for the Franklin board. It will then relink the Unix kernel. Answer 'yes' to all prompts after the kernel has been relinked. Place installation disk #2 in the disk drive when prompted and press **Enter**.

After the installation has been completed, exit the **sysadmsh** utility by selecting the **Quit** option and **Esc** key to pop back up through the menus.

The DROT uses tty02 and tty03 for its displays. The root account must disable logins on these two multiscreens in order for the DROT to work. This is done by entering:

disable tty02 tty03

Verify that the permissions are read-write for everybody by typing:

chmod 666 /dev/tty02 /dev/tty03

Finally, the system must be rebooted by entering **haltsys** in order to bring up the new version of UNIX.

Before running the DROT refer to Section 4.1 for information on setting the DROT configuration. Verify that the parameter settings are correct for your particular installation. At a minimum you will need to enter your 6 character DAPS user ID into the configuration file in order to receive electronic mail.

3. DROT USER INTERFACE

This section describes in detail the DROT user interface. Sections 3.1 and 3.2 describe the startup and shutdown procedures respectively. Section 3.3 gives general instructions for using the windowing system included with the DROT. Section 3.4 explains the realtime status display and gives instructions for changing the configuration while the DROT is running. Section 3.5 describes the DROT non-realtime features including message search, selection, and access; and network list editing. Finally section 3.6 explains how to edit the four network lists so that the DROT will only receive messages from the platforms in which you are interested.

3.1 Startup Procedure

To boot UNIX, power up the computer, monitor and printer. After the boot diagnostics are finished you will see the following prompt:

```
SCO System V/386

Boot
:
```

Simply press **ENTER**. A screen-full of copyright and status information will then be displayed, followed by the prompt:

```
Type CONTROL-d to proceed with normal startup,
(or give root password for system maintenance):
```

Press **CTRL-D** (Hold the **CTRL** key down and press **D**). The system then displays the current system time followed by the prompt:

```
Enter new time ([yymmdd]hhmm):
```

If the time is correct, just press **ENTER**. If the year, month, and day are correct but not the hour and minutes, enter the new hour and minutes in the format shown (HHMM), and press **ENTER**. Note that the hours are represented on a 24-hour clock. For example, if the correct time is five-thirty four PM, enter '**1734**' and press **ENTER**. If the either the year, month, or day is incorrect, you must enter the complete time in the format YYMMDDHHMM. For example, if it is five-thirty four p.m. on February twenty-seventh, 1989, enter '**8902271734**' and press **ENTER**.

You will then see the UNIX login prompt which should look something like the following:

```
scosysv!login:
```

Log into the drot account by entering 'drot'. When prompted for the password, enter the previously selected password.

When you have successfully logged into the drot account the system will display the C Shell prompt:

```
1%
```

To activate the DROT software enter:

1% drot

After a brief pause, the following prompt will be displayed:

Enable DOMSAT Link (y/n)?

If you do not want to enable the link right away (for example, if you wish to modify a network list first), type **n** and press **ENTER** (the link can be enabled later). Otherwise, type **y** and press **ENTER**. In either case, the following text will be displayed:

Press ALT-F2 for the DROT Status Display.
Press ALT-F3 for the DROT Non-Realtime Functions.

The DROT software runs in a 'background' mode so you may continue to perform other tasks using UNIX commands while logged onto the drot account or even log off the drot account if you desire.

3.2 Shutdown Procedure

It is important that the DROT and the UNIX system be shut down properly. **DO NOT SIMPLY TURN THE POWER OFF** as would be done if the computer were running MS-DOS. Doing so can damage the filesystem on the hard disk, and will require that the various fixup utilities be run when the system is next started. (See section 4.3. Recovering from an Improper Shutdown)

To shut the DROT software down, enter 'killdrot' while signed onto the drot account.
To shut UNIX down, login as 'root' giving the password that you supplied during installation. When you get the shell prompt '#', type '**/etc/haltsys**' and press **ENTER**. You will then see the following message:

** Normal System shutdown **

** Safe to Power Off **
-or-

** Press any Key to Reboot **

You may now power-down the monitor printer and system unit.

3.3 Windows Operation

Before going into the details of DROT operation, this section gives a brief explanation of the custom windowing functions which are used to implement the user interface.

3.3.1 Keystrokes

The keyboard interface is designed to be as simple and intuitive as possible. The following keystrokes have special meaning to the DROT:

ALT-F<N> Switch to multiscreen <N>. See the UNIX documentation for more information on

multiscreens. The DROT software uses (by default) screen 2 (ALT-F2) for the realtime status display and screen 3 (ALT-F3) for the Non-Realtime functions.

ESC — In general, this key means to abort the current window or object and return to the previous one, without saving any changes which may have been made.

ARROWS — The arrow keys are used to move from object to object within a window. The current object is always highlighted.

HOME — Move to the top object in a window.

END — Move to the bottom object in a window.

PAGE-UP/ PAGE-DN — Some windows contain too many objects to fit on the screen all at once. These keys are used to scroll up and down within a window.

ENTER — Used to select a menu item within a window.

SPACEBAR — Used to cycle forward through the values of a cycle-field in a window.

BACKSPACE — Used to cycle backward through the values of a cycle-field in a window.

INSERT — Used to toggle a text-entry field between insert and overstrike modes.

DELETE — Deletes the character under the cursor in a text- entry field.

F10 — Acknowledge any currently displayed alarms.

CTRL-L — Repaint the entire screen. This is useful if the screen has been garbled by a rogue process.

3.3.2 Window Structure

The DROT screens are structured as shown in Figure 3-1.

The top line gives the current GMT, the number of unread mail or bulletin messages in storage, and the current status of the DOMSAT link. The title area contains the title of the screen with some brief explanatory text. The Screen Body is different for each screen and is where all of the user-interaction takes place. The alarm area consists of three lines used to display critical system errors. Under normal operation these lines will be blank (See Appendix D for a list of possible alarms). The keystroke line gives a brief list a special keystrokes which are applicable in the current situation. The help line is used to display system responses to improper user input.

The screen body contains a number of 'objects'. Some objects are interactive (e.g. a menu item or text-entry field) and can be activated by moving the highlighted cursor to them with the arrow keys. Other objects are used for display only (e.g. the time field in the upper left corner) and cannot be activated.

Of the objects which can be activated there are three types: Menu Items, Cycle Fields, and Text Entry Fields. Each is described in the paragraphs below.

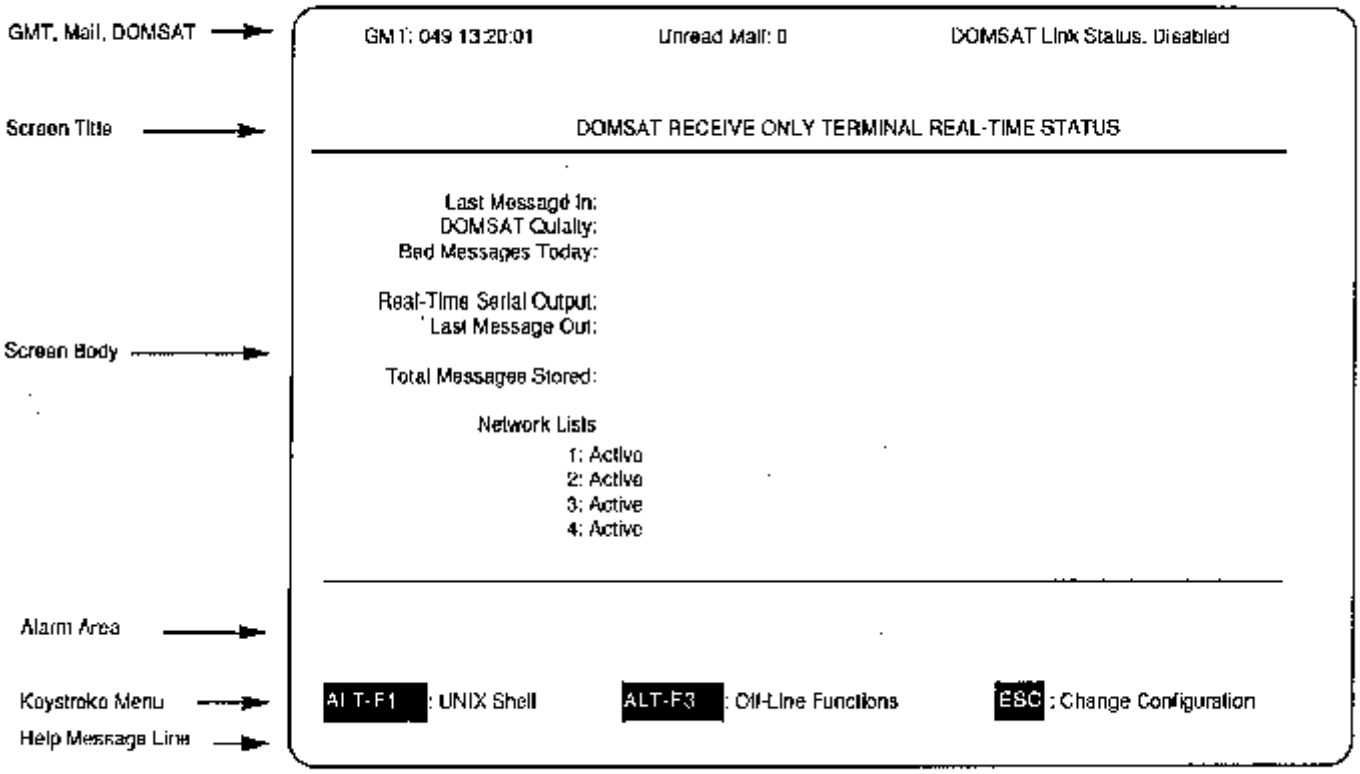

FIGURE 3-1: DROT SCREEN FORMAT

3.3.2.1 Menu Items

Menu Items are used to choose an option on the screen. Often the result of choosing a menu item is to bring up a lower level window. Examples of menu items are "Serial Parameters" and "Enable DOMSAT Link" on the DROT Realtime Status Display configuration window.

3.3.2.2 Cycle Fields

Cycle fields are used to set a parameter to one of a small number of valid values. The user moves to the cycle field with the arrow keys and then sets the parameter by pressing SPACEBAR continually until the desired value is displayed. An example of a cycle field is the baud-rate parameter in the Serial Line Configuration window.

3.3.2.3 Text Input Fields

Text entry fields are used to input such parameters as strings and numbers. An example of a text entry field is the DCP Address prompt on the non-realtime functions, Message Search screen.

When entering characters, you can either be inserting characters into the text (moving subsequent characters to the right) or overstriking the characters in the text. The INSERT key is used to toggle between insert and overstrike mode when entering text.

In overstrike mode, the SPACEBAR and BACKSPACE keys move the cursor through the text without changing anything. In INSERT mode, the SPACEBAR inserts a space where the cursor is resting, and the BACKSPACE key erases the character to the left of the cursor, moving the cursor one space to the left.

The DELETE key deletes the character directly under the cursor, moving subsequent characters to the left.

3.4 Realtime Status Screen

To view the realtime status screen, press ALT-F2 while the DROT is running. A sample status screen is shown in Figure 3-2.

The top line contains the current GMT, a tally of unread electronic mail messages, and the current status of the DOMSAT link. The status of the DOMSAT link can be one of the following:

- "Disabled" - The link is currently turned off.
- "Loading ICP" - The link was just activated and the communications program is being loaded onto the ICP188C communications processor.
- "Active" - The link is receiving DCP messages.
- "Timeout" - The link is activated but no messages have been received in the last 60 seconds. (The timeout period is actually a set table parameter. See section 4 for instructions on how to change it).

3.4.1 Dynamic Status Indicators

The screen body contains dynamic information about the DOMSAT link, serial output status, message storage, and network list activation. Each line is described below.

- "Last Message In" is the 16 bit sequence number of the last message received on the link, regardless of network list inclusion. Under normal operation it should change approximately twice per second. It should be always increasing except for wrapping around from 65535 to 0.
- "Bad Messages Today" is a tally of all messages received in the current day that had either a CRC or packet sequence error in them. At GMT 00:00:00 each day, the tally is written to the error log and the reset to zero.

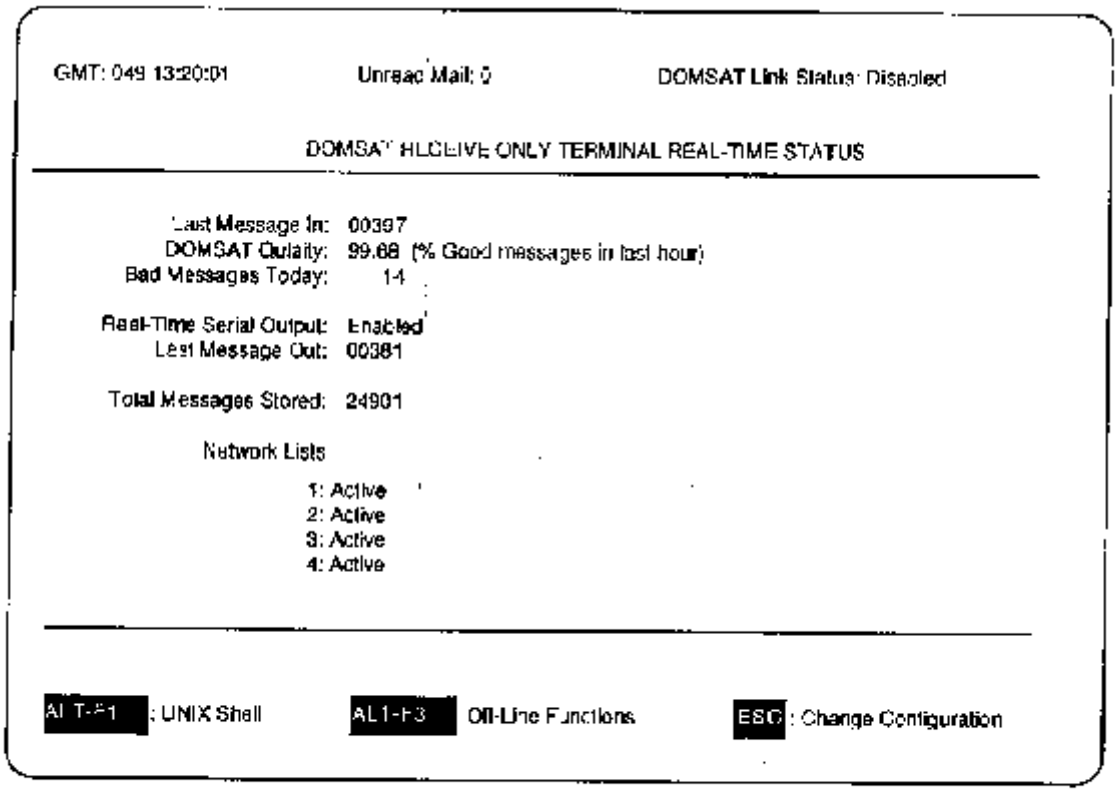

FIGURE 3-2: DROT REAL-TIME STATUS SCREEN

- "DOMSAT Quality" is the percentage of messages received in the last hour without CRC or packet sequence errors. It gives an overall indication of the trustworthiness of the link.

- "Realtime Serial Output" can be either "Enabled" or "Disabled". If enabled, all messages received which are on the active network lists are sent to the serial port as well as archived on the hard disk.

- "Last Message Out" is the 16-bit message sequence number of the last message sent out.

- "Total Messages Stored" shows the current number of DCP messages currently in storage. When the DROT is started for the first time, this number will continually increase until either the message storage file or the message directory become full. After that it will fluctuate around the same number as storage for old messages is reused by new incoming messages.

- "Network Lists 1 through 4" will be either "Active or "Inactive". "Active" means that messages from the DCPs whose address are contained in that list will be accepted and archived.

3.4.2 Interactive Configuration Change

While viewing the Realtime Status Display, press **ESC** to activate the Configuration Change Window. This display is shown in Figure 3-3. From here you can change the serial communications parameters, enable or disable realtime serial output, change the network list activation, enable/disable the DOMSAT Link, or acknowledge any alarms currently displayed. Details on each of these actions are provided below.

3.4.2.1 Serial Communications Parameters

To change the serial communications parameters, move the highlighted cursor to this menu item and press **ENTER**. A window will pop up showing the current values for port name, baud rate, bits per character, parity, and number of stop bits. This window is shown in Figure 3-4.

"Serial Device" is a text entry field. To change this, move the highlighted cursor to this item and type the name of the desired port. Note that UNIX uses the following names for serial ports:

tty1a = COM1 direct line
tty1A = COM1 with modem control
tty2a = COM2 direct line
tty2A = COM2 with modem control

Also since these devices are kept the the '/dev' directory, the full device name for COM1 is '/dev/tty1a'. If you have installed additional ports on your system, such as a multi-port serial board, see the (HW) section of your UNIX documentation for the appropriate device names.

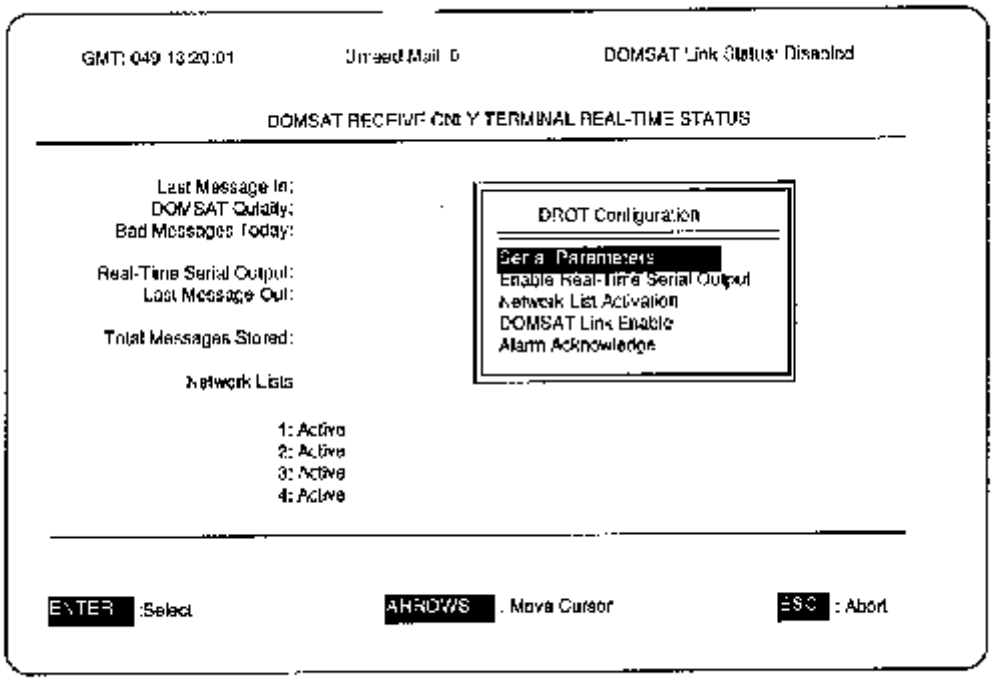

FIGURE 3-3: CONFIGURATION CHANGE WINDOW

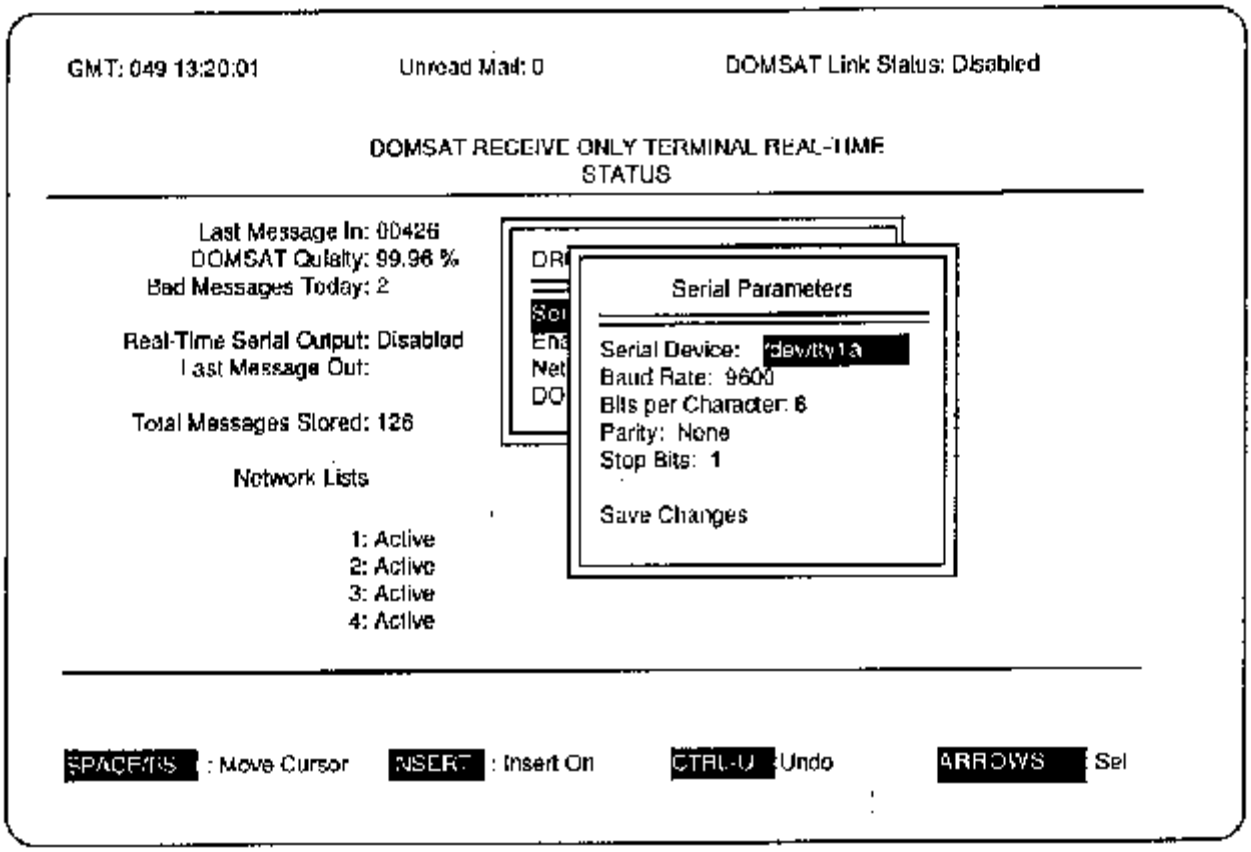

FIGURE 3-4: SERIAL PARAMETERS WINDOW

The other serial parameters are Baud Rate, Bits per Character, Parity, Stop Bits and Protocol. These are all cycle fields. To change any one of them, move the highlighted cursor to it and press **SPACEBAR** continually until the desired value is displayed.

Protocols provided are None, Xon-Xoff (CTRL-S,CTRL-Q) and Kermit. For more information on using the Kermit protocol see Appendix E.

After the parameters have been set, move the highlighted cursor to the bottom menu item, labeled "Save Changes" and press **ENTER**. If you have made a mistake and do not want to save the changes, simply press **ESC** to abort the window.

3.4.2.2 Realtime Serial Output

This is a menu item which will say either "Enable Realtime Serial Output" or "Disable Realtime Serial Output". To change this, move the highlighted cursor to this item and press **ENTER**.

When enabling realtime serial output, you are queried for a "Since Time". The default is the current time. This "catch up" option allows all DCP messages that have been received and stored since that time to be sent out the serial line when the line is enabled. When output "catches up", new DCP messages will be sent as they arrive.

3.4.2.3 Network List Activation

There are four network lists in the DROT system, any combination of which can be active. When a list is active, all DCP messages whose address is contained in that list are saved. To make a list active, move the highlighted cursor to "Network List Activation" and press **ENTER**. A window is brought up as shown in Figure 3-5.

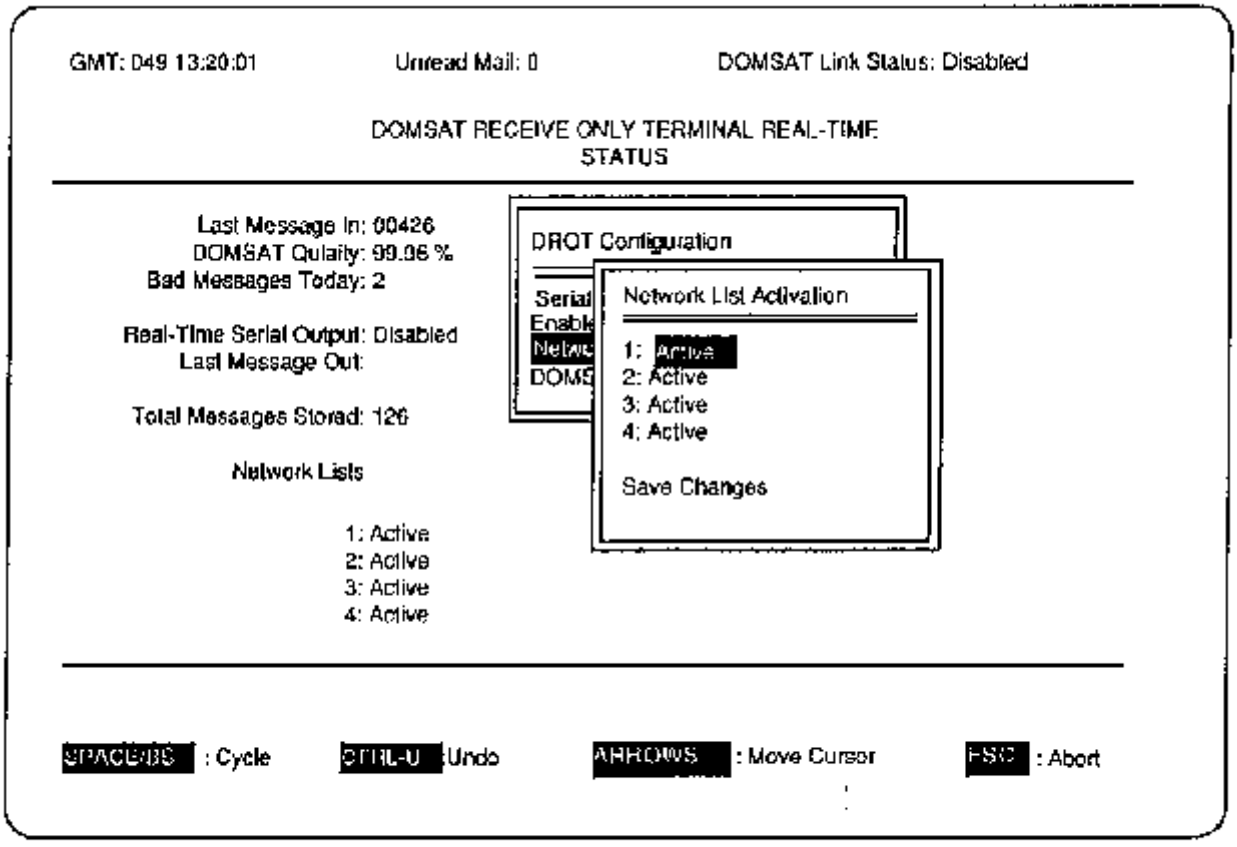

FIGURE 3-5: NETWORK LIST ACTIVATION WINDOW

On this window there are four items corresponding to the four network lists. You can toggle the lists between 'Active' and 'Inactive' by moving the highlighted cursor to the desired number and press **SPACEBAR**.

As with the Serial Parameters window, save the changes you have made by moving the highlighted cursor to the bottom item, labeled "Save Changes" and press **ENTER**. If you do not want to save your changes, simply press **ESC** to abort the window.

After changes have been made, they will be reflected on the Realtime Status display.

3.4.2.4 DOMSAT Link Activation

This is used to either enable or disable the domsat link. Depending on the current status of the link, this will either say "DOMSAT Link Enable" or "DOMSAT Link Disable". To change the link status move the highlighted cursor to this item and press **ENTER**.

3.5 Message Retrieval

The DROT is equipped with a sophisticated search-and-retrieval system tailored to users of the DCS. As DCP messages are received they are indexed according to a number of search criteria and then stored in chronological order in a large circular disk file. The results of the indexing are stored in a separate message-directory file.

When a user wants to retrieve DCP messages which are stored on the disk, he/she will do the following:

- 'Search' for desired messages based on a number of criteria.
- If specific messages are desired, the user might 'select' these from the results of the search. If none are selected, it is assumed that the user wants all of the messages found by the search.
- The user then accesses the selected messages in one of four ways: Display on the screen, Print, Transmit over the serial line, Save to disk.

The following sections describe how to do each of these operations.

To start the message-retrieval process, first press **ALT-F3** for the Non Realtime Functions window, then select **Message Retrieval** from the menu.

The Message Search Screen then comes up as shown in Figure 3-6. From here the user will perform all of the retrieval functions.

Along the left margin, the user sees a list of criteria which can be used in searching. Above the search criteria is an indicator labeled "Messages Found". This will display the count of messages meeting your criteria after a search has been performed.

Along the bottom of the screen body are three menu items. "Perform Search" is used after the user has selected the search criteria. "Select Messages" brings up a window containing just the DCP address and the time of receipt for each DCP message found in the search. From here the user can select individual messages. "Message Output" enables the user to access the messages once they have been found and

selected.

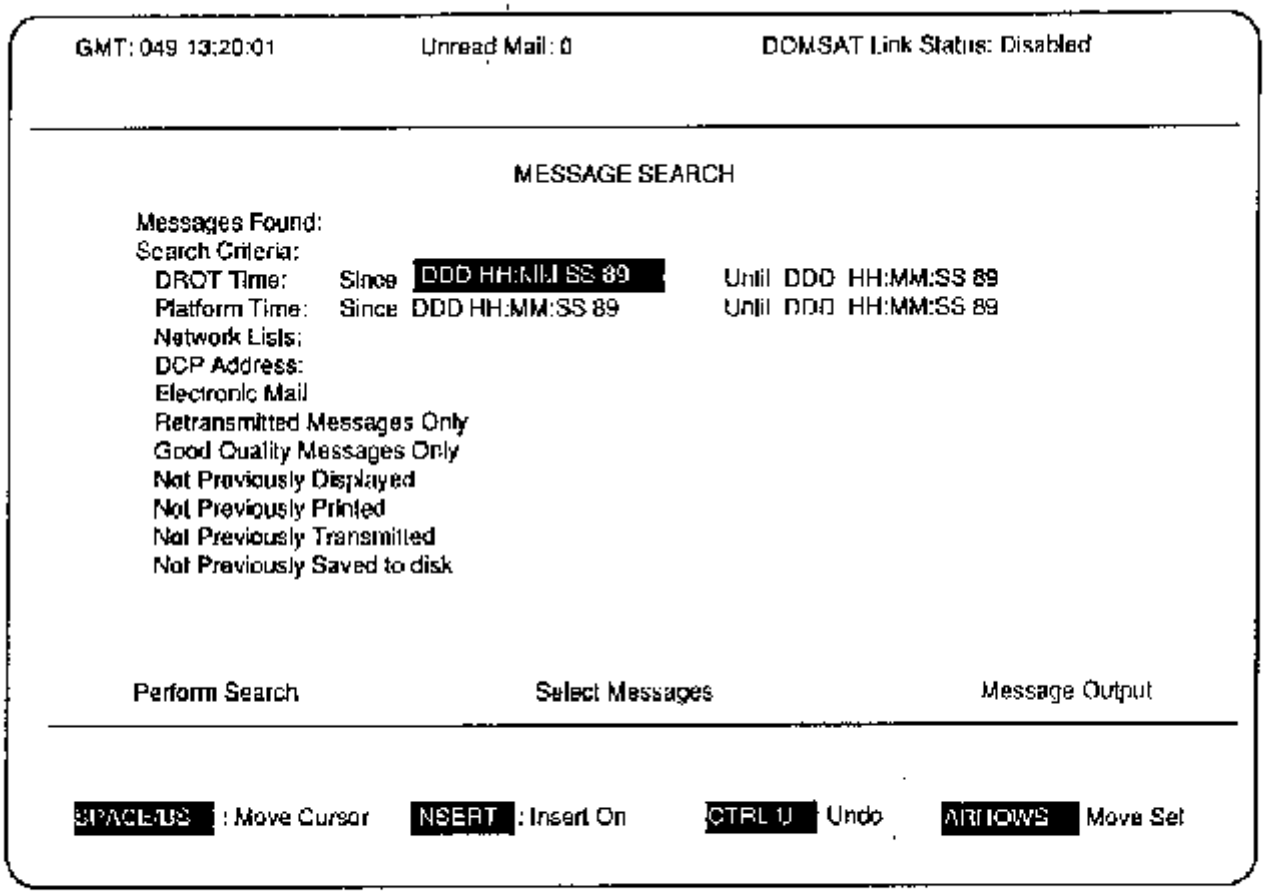

FIGURE 3-6: DCP MESSAGE SEARCH SCREEN

3.5.1 Choosing Search Criteria

Along the left margin of the Search Screen are all of the criteria which can be used in searching. These are a combination of text-entry fields and menu items.

To choose a criterion, move the highlighted cursor to it and enter a value (Since, Until, Network Lists, and DCP Address) or press **ENTER** (Electronic Mail, Retransmitted Messages, ...).

To turn-off a selected criterion, move the cursor to it and erase the value (Press **DELETE** several times) or press **ENTER**.

When a criterion is chosen, an asterisk appears to its left.

The following gives a brief explanation of each criterion.

- '**DROT Time: Since**' enables you to find only those DCP messages which were received by the DROT after a given date and time. Simply enter the Julian date and time in the format shown (DDD/HH:MM:SS [YY]). The time is assumed to be GMT.

- '**DROT Time: Until**' enables you to find only those DCP messages which were received by the DROT before a given date and time. Enter the Julian date and time in the format shown (DDD HH:MM:SS [YY]). The time is assumed to be GMT.

- '**DAPS Time: Since**'

- '**DAPS Time: Until**'

Each message transmitted over DOMSAT contains the time that the message started to be received by the DAPS in Wallops Island, VA. These criteria serve the same purpose as DROT Time above except that this embedded time field is used.

The DROT Time and DAPS Time of a message will usually be fairly close except in the case of retransmitted messages.

- '**Network List**' enables you to find only those DCP messages whose address is contained in a particular network list or lists. Enter the desired list numbers (1-4) in the space provided, separated by blanks or commas.

- '**DCP Address**' enables you to find only those DCP messages with a given address. Enter the eight hexadecimal digits of the desired (BCH-encoded) address in the space provided.

- '**Electronic Mail**' enables you to find global bulletins (intended for all DCS users), DCP bulletins (intended for all users of a particular DCP), and Mail (intended for particular users), which currently resides in your disk. Simply move the cursor to this item and press **ENTER**.

- '**Retransmitted Messages Only**'. Users of the DCS can request the retransmission of a DCP message or messages. When this has happened, this criterion enables the user to quickly locate these messages.

- '**Not Previously Displayed, Printed, Transmitted, or Saved to Disk**' enables you to find only 'new' messages that you have not already looked at in some way.

Any combination of search criteria can be chosen. Criteria are combined by a logical 'AND'. For example, if Network List 1 and Not Previously Printed are chosen, then the search will find only those messages whose DCP address is on network list 1 AND were not previously printed.

Also, a search can be performed without choosing any criteria. In this case all messages will be found by the search.

3.5.2 Performing a Search

After the desired criteria are chosen, perform the search by moving the cursor to the "**Perform Search**" menu item near the bottom of the screen. This can be done quickly by pressing **END, ENTER**.

The bottom line of the screen then informs you that the search is in progress. This may take several seconds. Finally the search will complete and the "Messages Found" indicator near the top of the screen will report the number of messages which were found.

Note that the current version of the DROT limits this number to 4096. To access more messages than this, you will have to use search and then access several times.

3.5.3 Selecting Individual Messages

This step is optional. It need only be done if you want to select particular messages for output.

Move the highlighted cursor to the center menu item near the bottom of the screen labeled "Select Messages". Then press **ENTER**. A pop-up window is displayed showing the DCP address and receipt time of each message found in the search, as shown in Figure 3-7.

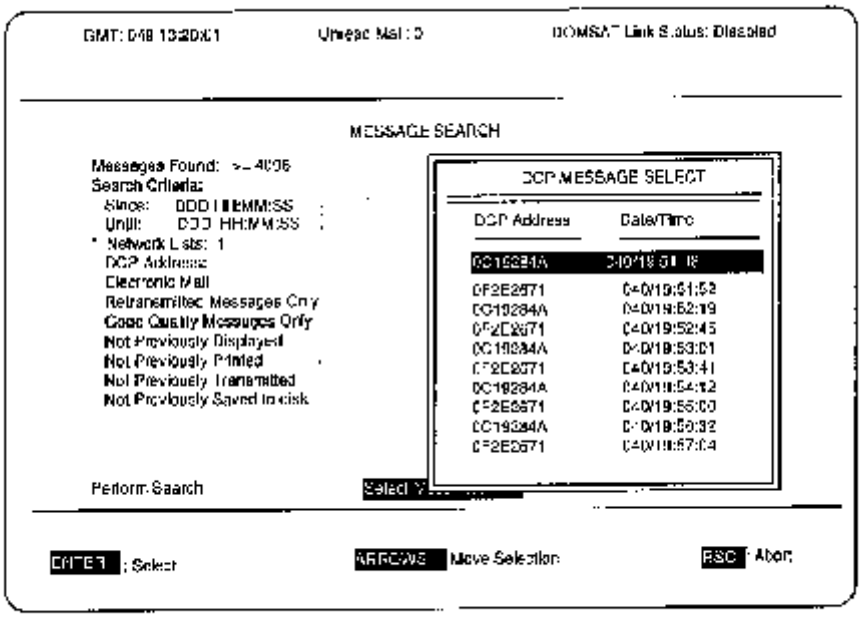

FIGURE 3-7: DCP MESSAGE SELECT WINDOW

When the window first appears, the top item is highlighted. From here you may browse through the messages using the **UP**, **DOWN**, **PAGE-UP**, **PAGE-DOWN**, **HOME**, and **END** keys. To select a particular message, move the highlighted cursor to it and press **ENTER**. You will then see an asterisk just to the left of the DCP address. To un-select a message, move the cursor to it and press **ENTER** again.

When all of your selections are made press **ESC**. The Select Window will disappear and you are returned to the Search Screen. If any selections were made, note that the number of messages selected is now displayed near the top of the screen, just to the right of the Messages Found indicator.

3.5.4 Message Output

Once a group of messages has been found by a search and (optionally) selected from the Select Window, it can to output in one of four ways. Move the highlighted cursor to the right-most menu item near the bottom of the Search Screen, labeled "Message Output", and press **ENTER**. A pop-up window will then appear as shown in Figure 3-8.

3.6.4.1 Displaying Messages

To display DCP messages select **DISPLAY** from the Message Output Window. Each DCP message will then be displayed on the screen in the format shown in Figure 3-9. After each screenful is displayed, press **ENTER** to continue or press **ESC** to exit back to the Message Output Window.

Each message displayed begins with a formatted header containing various message and transmission attributes. All of these attributes are transmitted with the message from the DAPS except .

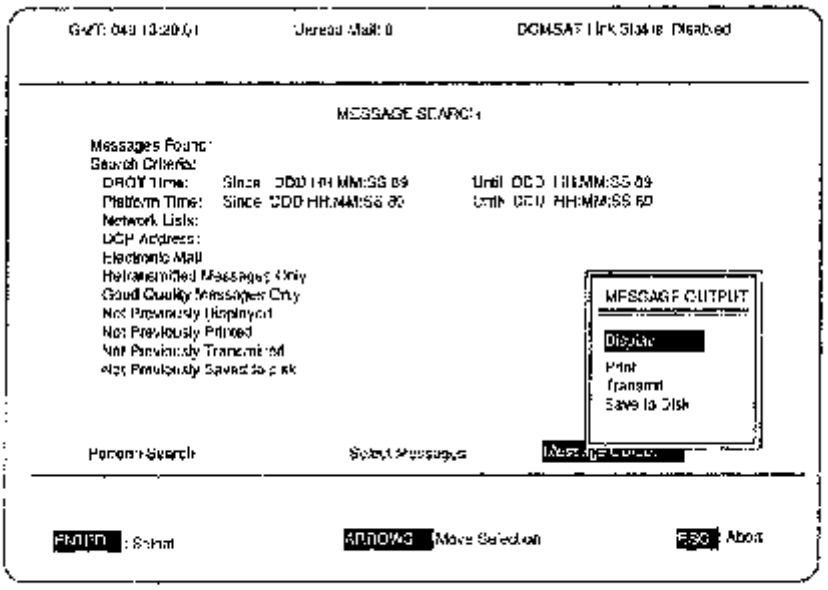

FIGURE 3-8: DCP MESSAGE OUTPUT WINDOW

for 'STATUS FLAG' and 'DROT TIME', which are attached locally by the DROT. 'STATUS FLAG' is where the DROT keep track of whether this message was received with CRC or packet sequence

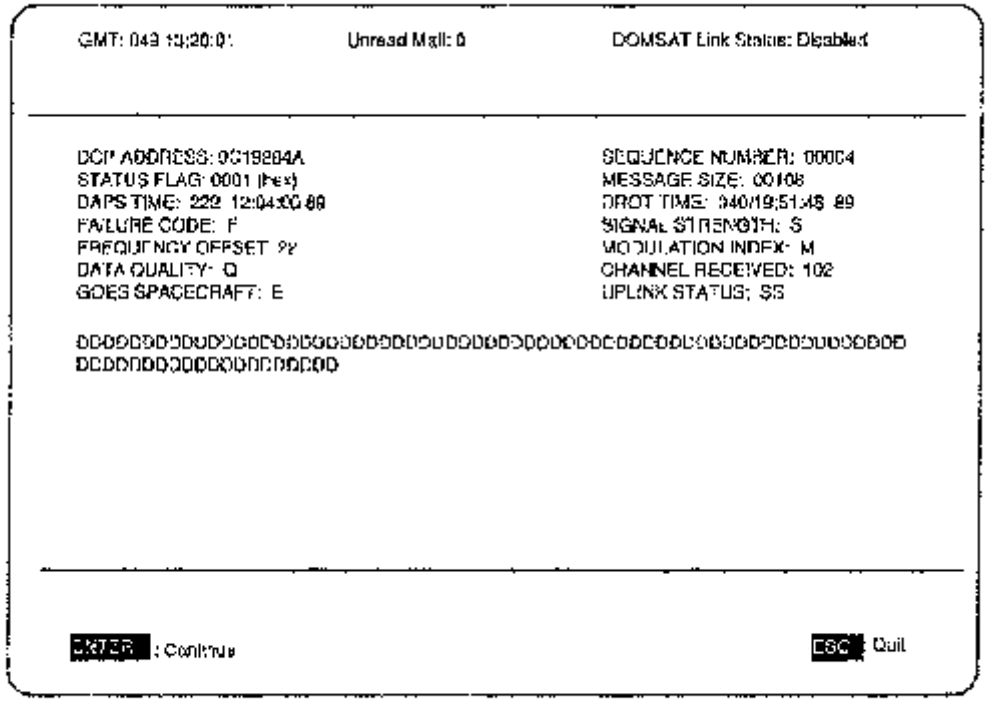

FIGURE 3-9: DCP MESSAGE DISPLAY

errors, or whether this message has been accessed previously and in what way. 'DROT TIME' is the time that the message was received by the DROT (in GMT). Assuming the local clock is set accurately, it should be fairly close to the 'DAPS TIME', except in the case of retransmitted messages.

For a description of DCP message attributes sent from DAPS, see appendix C.

3.5.4.2 Printing Messages

To print your group of DCP Messages, move the highlighted cursor on the Message Output window to "Print" and press **ENTER**. The messages are formatted and saved on a temporary file and then printed using the print command contained in the configuration file. (See section 4.1 to change this command.)

3.5.4.3 Transmitting Messages

To transmit your group of DCP Message via the serial port, move the highlighted cursor on the Message Output Window to "Transmit" and press **ENTER**. The messages are then queued to the serial output spooler process. Note that this action may not be performed if realtime serial output is currently enabled (see sections 3.4.1 and 3.4.2.2). In addition, if realtime serial output is enabled after serial output has been initiated from this menu, realtime serial output will take precedence, interrupting the flow from this request. Serial output from this request will continue after realtime output has been disabled.

3.5.4.4 Saving Messages to Disk

To save messages on a disk file (separate from the DROT's circular message-storage file), move the highlighted cursor on the Message Output Window to "Save to Disk" and press **ENTER**. You will then be prompted for a filename on which to save the messages. If the named file already exists, you will be warned and will have the option of overwriting the existing file, appending to the existing file, or entering a different filename.

If you wish to save the file on a floppy disk, you have the following options:

- Use the UNIX 'tar' program to save the file(s) on a floppy disk. First format a high-density floppy disk, and then save the files on it with the following commands:

  fmth
  tar cv2 file1 file2 ...

To restore the files to another UNIX system, place the floppy in the high-density drive and type:

tar xv2

- Save the file on an MS-DOS formatted disk. Format the disk and then copy the file(s) to it with the following commands:

  dosformat a:
  doscp file1 file2 ... a:

The file(s) may then be restored on any MS-DOS or UNIX system.

- Create a mountable UNIX file system on a floppy disk and then mount it on a local directory. The file may then be copied directly to the floppy using the UNIX 'cp' command. (See the UNIX documentation for instructions on how to create a mountable UNIX file system).

3.6 Network List Edit

There are four network lists labeled "nl1", "nl2", "nl3", and "nl4" in the drot directory. These are ASCII text files with the following format:

- Blank lines are OK. They are ignored by the DROT.
- Comment lines begin with a '#'.
- DCP lines begin with an eight-hex-digit DCP Address, optionally followed by a space or tab and a (50- character max) comment.

You can edit this file with the text editor of your choice or you can use to editor provided with the DROT to insert and delete DCP Addresses and comments. The following sections explain the use of the DROT Network List Editor.

3.6.1 Starting the Network List Editor

To start the DROT Network List Editor press **ALT-F3** to display the Non-Realtime Functions Screen and press **ESC** a number of times until you see the menu with the title "DROT Non-Realtime Functions". From this menu select **Network List Edit**. The next menu asks you which list you want to edit and is shown in Figure 3-10.

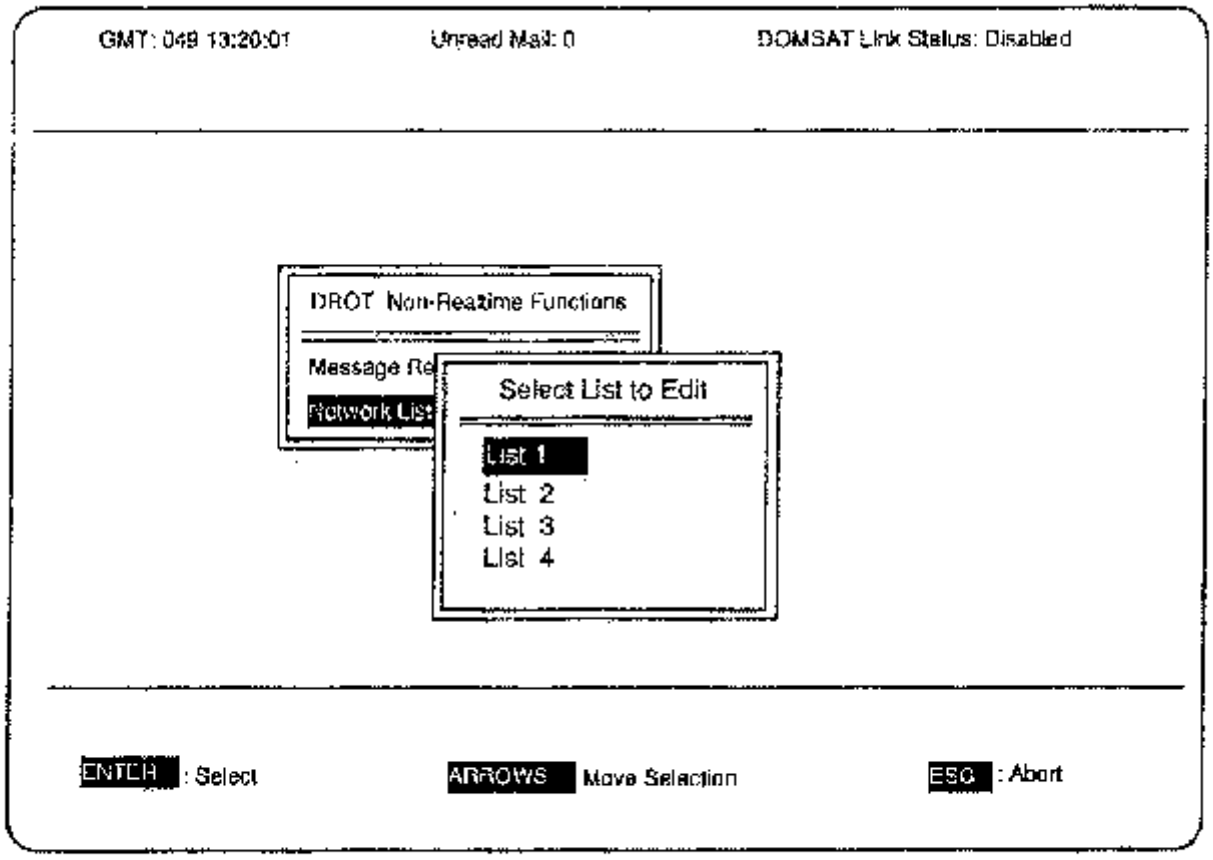

FIGURE 3-10: "SELECT LIST TO EDIT" MENU

Select the desired list from the menu. The list will then be displayed on the screen as shown in Figure 3-11. Note the menu of function keys which appears on the bottom of the screen.

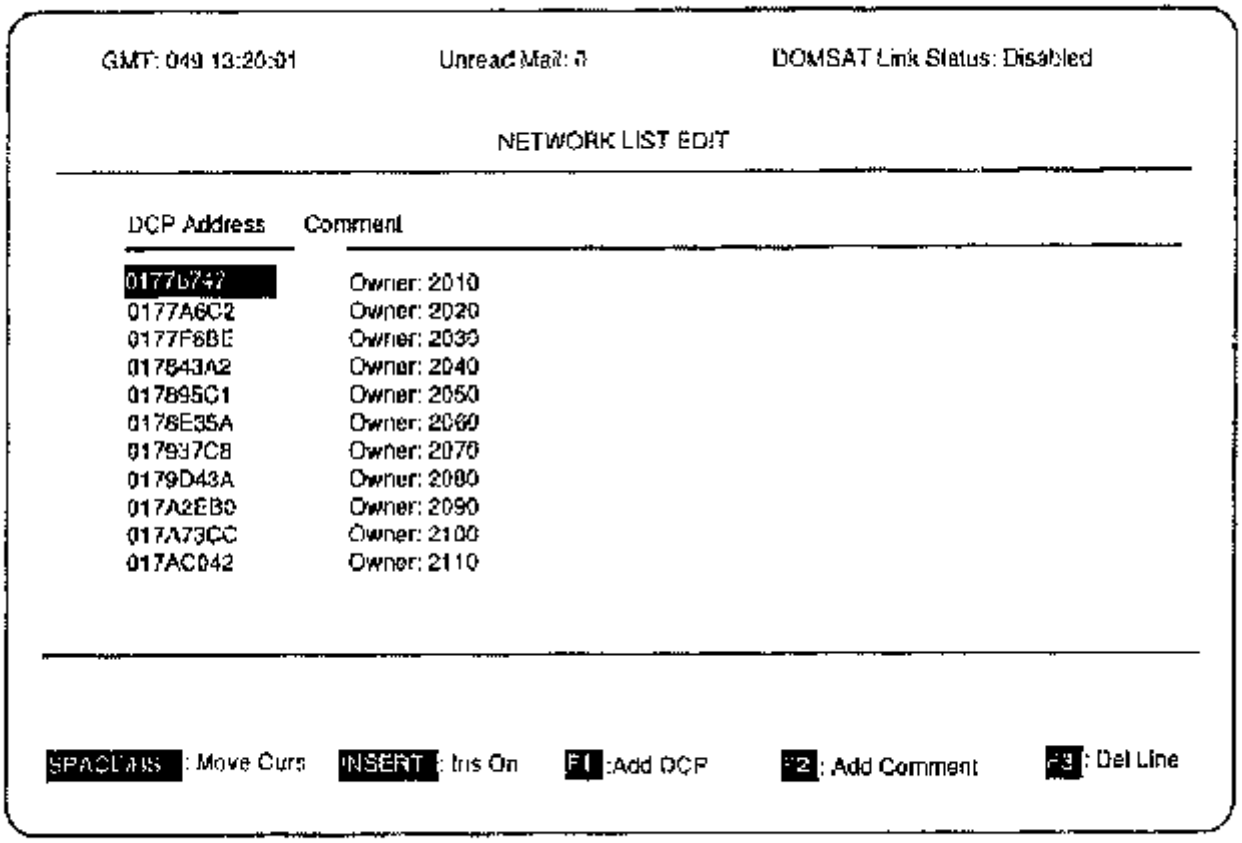

FIGURE 3-11: NETWORK LIST EDIT

3.6.2 Adding a DCP to a List

To add a DCP to the list move the highlighted cursor to the desired insert-location and press **F1**. Space will be opened just before that point for you to enter a new DCP address and an optional comment. Note that a list cannot contain more than 3000 platform addresses.

3.6.3 Adding Comment Lines

To add a comment line to the network list, move the highlighted cursor to the desired insert-location and press **F2**. Space will be opened just before that point for you to enter a comment line. Note that comment lines must begin with '#'.

3.6.4 Deleting a DCP or Comment Line

To delete a DCP or comment line from a network list, move the highlighted cursor to the desired location and press **F3**. The selected line will disappear and subsequent lines will be moved up.

3.6.5 Quitting and Saving Changes

When all changes have been made to the network list, press **ESC**. You will then get a pop-up window asking you if you want to save the changes. Type '**Y**' and press **ENTER**. The new list will be saved on disk and, if the list is currently active, will be downloaded to the ICP driver.

4. DROT MAINTENANCE

This section describes various maintenance tasks to be performed on the DROT. Section 4.1 explains the configurable parameters of the DROT, and how they can be changed. Section 4.2 describes the log kept by the DROT of various events and alarms. Section 4.3 tells how to recover from an improper shutdown, such as a power failure. Section 4.4 explains the DROT FIXUP utility which is used to restore a corrupted message-file or message directory.

4.1 DROT Configuration

When the DROT software is started it reads a file called "drotconfig" in the drot directory. This file contains the values of various settable parameters. The default configuration (as installed) is shown in Appendix B. You can change the configuration by simply editing this file.

Note: You cannot edit the 'drotconfig' file while the DROT is running!

Use the text editor of your choice to modify 'drotconfig'. UNIX comes with the VI, EX, and ED text editors. You will need to become familiar with one of these.

'drotconfig' is an ASCII text file. Lines beginning with '#' are comment lines and are ignored. Blank lines are OK. Other lines begin with a parameter name followed by a colon, and then the parameter settings. The following is a brief explanation of the settable parameters.

- **XLINE: <device> <data-rate> <driver-mode>**

  The 'device' is the filename of the UNIX device node. The node is created as '/dev/icp' when the DROT is installed and should not be changed. The data-rate of DOMSAT is currently 56,000 Kbps. This also cannot be changed.

  The 'driver-mode' can be either 'DROT' or 'ALL'. In 'DROT' mode, the driver will return only the DCP messages whose address is contained in the active network list. In 'ALL' mode, all messages will be returned. 'All' mode may be used for testing the DOMSAT link.

- **DOMSAT_TIMEOUT: <seconds>**

  This specifies the number of seconds after which, if no messages are received over the DOMSAT link, a timeout alarm will be generated. The default is 90.

- **ICP_PROGRAM: <program-name>**

  This is the name of the program which is downloaded to the Franklin Telecom ICP188C communications card to handle the X.25 protocol of DOMSAT. It is set to 'bin/188x25.exe' at installation and should not be changed.

- **SERIAL_LINE:<device> <baud> <bits> <parity> <stop-bits>**

  This specifies the serial parameters used in forwarding DCP messages to another computer. The default values set at installation are device=/dev/tty1a, 9600 baud, 8 bits per character, no parity, 1 stop bit.

- **MSG_BEG: <string>**

- **MSG_END: <string>**

When messages are transmitted via the serial port or saved to disk they can be framed by these strings. MSG_BEG specifies an optional string saved or transmitted before the actual message, and MSG_END specifies a string saved or transmitted after the actual message. If the string is to contain blanks it must be surrounded by double-quote marks. If the string is to contain a double-quote mark, it must be preceded by a backslash. The following control characters are recognized:

\n - Linefeed (octal 012)
\f - Formfeed (octal 014)
\r - Carriage Return (octal 015)
\t - Tab (octal 011)
\b - Backspace (octal 010)

Other control characters or characters above 127 may be specified by exactly three octal digits preceded by a backslash. For example, linefeed could also be specified as \012.

For example the string **"ab c\n\"de\377"** specifies a 9- character string. The third character is a space. The fifth and sixth characters are linefeed and a double- quote, respectively. The last character has an octal value of 377

- **RT_TERMINAL: <dev> <type> <init> <cons> <fore> <back>**

- **OL_TERMINAL: <dev> <type> <init> <cons> <fore> <back>**

These lines specify the terminals to be used for the realtime status display and the non-realtime functions display when the DROT is running. 'dev' is the device name. 'type' is the type of terminal as specified in the termcap or terminfo databases. 'init' is an optional string sent to the terminal when the DROT is started up, which is useful for setting up colors and other attributes. It may contain control characters specified in exactly the same was as described above for MSG_BEG and MSG_END. 'cons' is a 1 if the terminal is one of the UNIX multiscreens and 0 otherwise. 'fore' and 'back' are the color numbers for normal foreground and background character display, as defined in the following table:

0	Black	8	Gray
1	Blue	9	Intense Blue
2	Green	10	Intense Green
3	Cyan	11	Intense Cyan
4	Red	12	Intense Red
5	Magenta	13	Intense Magenta
6	Brown	14	Yellow
7	White	15	Intense White

- **ALARMCOLOR: <foreground>**

This specifies the color in which alarms are displayed on the CRT screen. Only the foreground color is specified. The background will be the same as the normal colors specified above.

- **MESSAGEFILE: <filename>**

  The DROT saves messages in a file with the given name. It also creates a message-directory file, which has the the same name as the message file with ".D" appended. The filename can have up to 12 characters.

- **max_storage: <bytes>**

- **max_records: <messages>**

  The message file and the directory file are both circular files. This means that when they reach their maximum size, they starts overwriting the oldest messages as new ones arrive. 'max_storage' specifies the maximum message-file size in bytes. 'max_records' specifies the maximum number of DCP messages which can be stored at any time. 'max_records' should be at least the value of max_storage divided by 100.

- **ACTIVE_LIST: <list numbers...>**

  There are four network lists named "nl1", "nl2", "nl3", and "nl4". Any combination of the four can be active. This parameter specifies which ones are active. The default at installation is "1 2 3 4" (all lists active).

- **PRINTCMD: <command-string>**

  The DROT prints DCP messages by formatting them in a temporary file and then sending the temporary file to the normal UNIX printing utilities. This command string determines which utilities will be used for printing. The string must contain '%s' in it which will be replaced by the name of the temporary file.

  For example, the following string will format the file with the 'pr' utility and then pipe it to the 'lp' utility.

  "pr %s | lp"

- **RT_SERIAL_OUTPUT: <enabled/disabled>**

  If this is 'enabled' then DCP messages will be sent out the serial port as they are received and archived. If this is 'disabled' they will not.

- **GLOBAL_BULLETINS: <DCP address>**

- **DCP_BULLETINS: <DCP address>**

- **MAIL: <DCP address>**

- **DAPS_ALIVE: <DCP address>**

  These are four message types which do not originate at DCPs. Each has a special address associated with it. These addresses are assigned by the NESDIS DAPS administrator and should not be changed. Global Bulletins are intended for all users. DCP Bulletins are intended for users of a particular DCP. Electronic mail is intended for individual users. The DAPS-ALIVE message

is sent at least once every 60 seconds and can be used for testing.

- **USER_IDS: <ID1 ID2 ...>**

  Each user has a unique 6 character user ID. It is possible that a DROT may be used by more than one user. This field lists all of the user IDs for this DROT and is used for receiving electronic mail. It should be changed when the DROT is first installed and whenever the user IDs change. Each DROT may be configured for up to 31 user IDs.

4.2 The DROT Event Log

The DROT records the time of events such as system startup and shutdown, DOMSAT enabling and disabling, and all errors and alarms. Each entry gives the date, time, name of the process generating the event, and a brief description of the event. The following is a sample of possible logged events:

```
283/13:46:36: t_ctrl: ***** DROT Starting up
283/13:46:48: t_recv: Archive file is empty
283/13:46:48: t_recv: Directory 'messages.D' is empty.
283/13:46:54: t_ctrl: Disabling DOMSAT
283/13:46:59: t_ctrl: Enabling DOMSAT
289/17:07:37: t_ctrl: ***** DROT Shutdown
```

Note that the times stored in the log are in GMT with the first three digits being the Julian date. Most of the entries are self explanatory and are generated as a direct result of some action taken by the user. In the above example the second and third events were generated by the DROT receive-process (t_recv) and indicate that the message-file and message-directory were empty. This will happen the first time the DROT is started up and is not necessarily an error.

The DROT stores the log in two files in the DROT home directory called "errlog.a", and "errlog.b". When one file reaches its one-half megabyte size limit, the DROT erases the other file and starts using it.

4.3 Recovering from an Improper Shutdown

The DROT is continually updating two files, the message-storage file and the message-directory file. The message-storage file contains the actual DCP message data plus a header added by the DROT (containing a time stamp, quality indicator, etc.). The message directory contains various attributes of each message and a pointer to each DCP-message in the message-storage file.

Two things can happen when the system is simply turned-off or if a power failure occurs:

- The shutdown may occur after a group of messages has been written to the message-storage file but before the corresponding message-directory entries were created.

- Since UNIX buffers all disk-I/O, any data written by the DROT may still be in a buffer in RAM. That is, it may not have been written to the disk yet.

In both cases, the message-storage file and the message-directory may not agree. The discrepancy will be reported the next time you try to run the DROT, and to fix it, you will have to run a utility called 'fixup', which compares the two files and eliminates any discrepancies. For a 20MB file this will take

approximately 1 hour.

See section 4.4 below for instructions on running the fixup utility.

When the system is not shutdown properly discrepancies are also created in the UNIX file-system structures. When the system is rebooted it will run a utility called 'fsck' (File-System CheckK). This will not take long and is done automatically.

4.4 The FIXUP Utility

The FIXUP Utility brings the message directory file into agreement with the message storage file. This is only necessary after an improper shutdown so that DCP message data which arrived just before the shutdown will not be lost.

The fixup utility checks for the following error conditions:

- Directory entries with the same offset (The incorrect entry is removed.)
- Gaps between messages in the message file (no action taken.)
- Directory entry with an offset that does not point to a message (the entry is removed.)
- A DCP message in the message file with no corresponding directory entry (a new entry is created).

When errors are detected, fixup will display an error message to the standard output and will attempt to fix the discrepancy. It does this by building a new message-directory in a temporary file and then replacing the existing message-directory with the new one.

Login as 'drot' to use the FIXUP utility. The command has the following syntax:

fixup [-q] [-r] [-d] [-t <tmp-dir>]

The options have the following meaning:

-q (quiet) Do not report any errors found to the standard output.

-r (read only) Report all errors but do not fix anything.

-d (dups only) Report and fix duplicate records only, do not compare the message file with the directory file. (This is much faster but not as thorough).

-t <tmp-dir> Fixup recreates the directory in a temporary file. This option causes the file to be created in the named directory rather than '/usr/tmp'. Use this option if your DROT has separate filesystems for '/u' and '/usr' and limited space under '/usr'.

A more drastic alternative to fixing the corrupted message files is simply to delete them. **DOING SO WILL ERASE ALL DCP MESSAGES CURRENTLY STORED BY THE DROT**. To do this login as 'drot' and then delete the message file and directory file by typing the command:

rm <filename> <filename>.D

where <filename> is the value of MESSAGEFILE as specified in the 'drotconfig' file.

If there are still problems restarting the DROT after an improper shutdown, check for the existence of the following files:

/usr/drot/drot_running
/usr/drot/t_cnfgkey
/tmp/scrout
/tmp/scrclock

These are temporary files which the DROT software creates when it is activated. These files are removed by the DROT software during normal shutdown. If they exist when the DROT software is inactive, they should be removed using the UNIX 'rm' command.

5.0 Selected DROT User Scenarios

This section contains several examples for performing various tasks on the DROT. It is not intended to be exhaustive, but rather to illustrate the combined use of features described above in detail.

5.1 Periodically Transmit all newly-arrived DCP messages

A common way to use the DROT will be to let it run continuously with realtime serial output disabled. Then, periodically (perhaps once per day) the user will retrieve any new messages which have arrived and send them all at once over the serial line. The DROT then acts like a buffer and protocol translator for the user's main processing facility.

- Start up the DROT software by logging into the drot account and entering 'drot'.
- When prompted, enable the DOMSAT link.
- Press **ALT-F2** to display the Realtime Status Screen (as shown above in Figure 3-2).
- Verify that the 'Last Message In' indicator is occasionally incrementing.

In this scenario we want to find any new messages which arrived since the last time we checked, hence we will simply search for all messages that have not been previously transmitted.

- Press **ALT-F3** to display the Non-Realtime-Functions Screen.
- Press **ESC** until you see the menu with the title "DROT Off-Line Functions".
- Then press **HOME, ENTER** to select "Message Retrieval".

You will then see the message search screen, as shown above in Figure 3-6.

- Press **DOWN** several times until the cursor is over "Not Previously Transmitted".
- Press **ENTER** to select this criterion.
- Press **END, ENTER** to perform the search.

After a moment the system will beep and the number of messages found will be displayed near the top of the screen.

- Press **RIGHT, ENTER** to select "Message Output".
- From the Message Output Menu select "Transmit".

The messages will be spooled to the serial output process and transmission will begin. Also, the DROT will now remember that all of these messages have been transmitted, so that the next time the same search is performed, they will not be found.

5.2 Retrieve and Print Bulletins and Electronic Mail

The "Unread Mail" indicator is found on the top line of both the Realtime Status and Off-Line Functions screens. When this is non-zero, it means one or more of the following:

- A global bulletin addressed to all DAPS users has arrived.
- A bulletin addressed to users of a particular platform (that I am using) has arrived.
- An electronic mail message addressed to one of the users of my DROT has arrived. Hence the term 'mail' has a broader meaning on the DROT then it does to the DAPS.
- Press **ALT-F3** to display the Non-Realtime-Functions Screen.
- Press **ESC** until you see the menu with the title "DROT Off-Line Functions".
- Then press **HOME, ENTER** to select "Message Retrieval". You will then see the message search screen, as shown above in Figure 3-6.
- Press **DOWN** several times until the cursor is over "Electronic Mail".
- Press **ENTER** to select this criterion.
- Press **DOWN** again until the cursor is over "Not Previously Printed".
- Press **ENTER** to select this criterion also.
- Press **END, ENTER** to perform the search.

This search will find any electronic mail or bulletins currently in storage which have not been previously been printed. After a moment the system will beep and the number of messages found will be displayed near the top of the screen.

- Press **RIGHT, ENTER** to open the Message Output Window.
- From this window select "Print". The messages will be spooled to the printing utility and printing will start.

5.3 Retrieve Specific Messages from a Known Time Range

In this scenario we will search for a specific message from two platforms which we know are supposed to report within a given time range. We will then display these messages on the screen.

Assume that the platforms we are interested in have the addresses '00000ED2' and '00001092' and we know they are supposed to report between 13:01:00 and 13:05:00 GMT on day 108 in 1990. To allow for a fudge factor, we will widen this time window by 5 minutes on either side.

- Press **ALT-F3** to display the Non-Realtime-Functions Screen.
- Press **ESC** until you see the menu with the title "DROT Off-Line Functions".

- Then press **HOME, ENTER** to select "Message Retrieval".

You will then see the message search screen, as shown above in Figure 3-6.

- Using the arrow keys, move the highlighted cursor to the DROT Time - Since field.
- Enter **108/12:56:00 90** in this field.
- Press **RIGHT** to move the cursor to the Until field.
- Enter **108/13:10:00 90** in this field.
- Press **END, ENTER** to perform the search.

This search will quickly find all messages which were received by the DROT in that time interval. After a moment the system will beep and the number of messages found will be displayed near the top of the screen. The cursor will be over 'Select Messages' at the bottom of the screen.

- Press **ENTER** to activate the Select Window.

This window shows a list of the DCP Addresses and Times of the messages found by the search. The top message will be highlighted.

- Using the **UP** and **DOWN** arrow keys, move the cursor to the first message in the list which has the address 00000ED2 or 00001092.
- Press **ENTER**. An asterisk will appear to the left of the DCP address indicating that this message is now 'selected'.
- Scroll through the list selecting all messages which have the desired addresses.
- When finished, press **ESC**.

Note that the 'Messages Found' indicator near the top of the screen now also reports the number of messages selected.

- Press **RIGHT, ENTER** to open the Message Output window.
- Move the cursor to 'Display' and press **ENTER**.

The first selected message will be displayed as shown in Figure 3-9 above. You can scroll through the messages by successively pressing **ENTER**.

APPENDIX A: DROT SYSTEM REQUIREMENTS

The following is necessary to run the DROT software:

- o Industry Standard 386Computer (PC/AT/EISA bus)
- o At least 8 megabytes of RAM
- o One RS-232 serial port
- o One parallel printer port
- o One high-density (1.2 MB) floppy disk drive
- o Hard disk of at least 100 MB for 20 MB of DCPmessage storage (140 MB if Development System is installed)
- o Keyboard
- o Any standard video controller and monitor (HGC, CGA, EGA, or VGA)
- o Printer
- o *Franklin Telecom ICP188C Communications Processor
- o **SCO UNIX Operating System System V/386, Version 2.3
- o Custom DROT Software furnished by government
- o Satellite Antenna and Interface (TBD)

* Available from Franklin Datacom, 733 Lakefield Rd., Westlake Village, CA 91361, (805) 373-8688.

** Available from The Santa Cruz Operation, Inc., 400 Encinal Street, P.O. Box 1900, Santa Cruz, CA 95061, (800) 626-8649.

APPENDIX B: DEFAULT DROT CONFIGURATION

The following is the DROT configuration file as provided in the installation floppy. For a description of the contents, see section 4.1.

```
#
# DROT Configuration File
#

#
# X.25 Parameters:
#
XLINE: /dev/icp 56000 DROT


#
# Timeout for DOMSAT:
#
DOMSAT_TIMEOUT: 90


#
# Program to download to ICP:
#
ICP_PROGRAM: bin/188x25.exe

#
# Serial Line Parameters:
#
SERIAL_LINE: /dev/tty1a 9600 8 none 1

# Strings sent at beginning and end of each message:
MSG_BEG: ""
MSG_END: "\n\n\n"

#
# Realtime Terminal:
#
RT_TERMINAL: /dev/tty02 ansi "\033[2;15;1m\033[7;0;2m" 1 15 1

ALARMCOLOR: 4

#
# Off-Line Terminal:
#
OL_TERMINAL: /dev/tty03 ansi "\033[2;15;1m\033[7;0;2m" 1 15 1

#
# Various Operational Parameters:
#
```

MESSAGEFILE: messages
max_storage: 20000000
max_records: 300000
ACTIVE_LIST: 1 2 3 4
PRINTCMD: 'pr %s | lp'
RT_SERIAL_OUTPUT: disabled
GLOBAL_BULLETINS: 11111111
DCP_BULLETINS: 22222222
MAIL: 33333333
DAPS_ALIVE: DADADADA
USER_IDS: ID0001 ID0002 ID0003 ID0004

APPENDIX C: DCP MESSAGE FORMAT

This appendix details the format of DCP messages as saved and transmitted by the DROT. It does **not** describe the X.25 subset used for messages transmitted over DOMSAT. For that information see the DROT/DQM Software Maintenance Manual.

All messages saved (to separate disk storage) or transmitted (over the serial line) will be preceded and succeeded by the MSG_BEG and MSG_END strings specified in the 'drotconfig' file (see section 4.1). The format of the actual message is given in the following table:

Item	Length (bytes)	Format
DCP Address	8	ASCII hex digits (0-9, A-F)
Arrival Date/Time:		
Year	2	ASCII digits
Day	3	ASCII digits (Julian day)
Hour	2	ASCII digits (00 - 23)
Minute	2	ASCII digits (00 - 59)
Second	2	ASCII digits (00 - 59)
Failure Code	1	ASCII character:
		G Good Message
		? Parity Error
		W Received on wrong channel
		D Duplicate (multiple chan)
		A Correctable Address Error
		B Bad Address
		T Time error (early/late)
		U Unexpected Message
		M Missing Message
		I Invalid Address
		N Non-complete entry in PDT
		Q Bad Quality Measurements
		C Comparison error on test transmission
Signal Strength	1	ASCII digits
Frequency Offset	2	ASCII digits
Modulation Index	1	ASCII character
Data Quality	1	ASCII character
Channel Received	3	ASCII digits
Spacecraft Received	1	ASCII char: 'E' or 'W'
Uplink Carrier Status	2	ASCII hex digits: Status for spacecraft on which message was received.
Message Data Length	5	ASCII digits
Message Data		<variable> <variable>

Note that the characters of the message data and the quality measurements (signal strength, frequency offset, modulation index, and data quality) retain the parity information as transmitted by the originating platform. This is usually seven bits, even parity. The characters of the other header items will be transmitted as eight bits, no parity. When messages are displayed or printed, the parity information is removed.

APPENDIX D: LIST OF POSSIBLE ALARM MESSAGES

Each alarm in the list below is preceded by the name of the process which generated it. The text of the alarm is given followed by a brief explanation. If '(FATAL)' appears after the alarm text it means that the occurrence of the alarm will also cause the DROT to cease functioning.

t_ctrl: Could not send SER_CNFGCHANGE
Unable to send configuration change to serial output task

t_ctrl: Cannot add list <list number>
The specified network list could not be made active.

t_oluser: Cannot open network list file <nl?>
The Non-realtime Functions Task could not open the specified network list for for reading. Either it doesn't exist or there is a permission problem.

t_oluser: Cannot open network list for writing
Non-Real Time Functions Task could not open the specified network list for for writing, probably due to a permission problem.

t_oluser: Error searching directory
A system read-error occurred while searching the directory entries.

t_recv: Read error (FATAL)
Error reading Franklin ICP188C.

t_recv: Timeout on DOMSAT Link
No DCP messages have been received in the time period specified in the drotconfig file (default = 90 seconds).

t_recv: ICP Error: Host too slow -- message dropped
Internal buffers on Franklin ICP188C became full before the PC could empty them. Hence some DCP messages may have been dropped. This could happen if the system is heavily loaded with non-DROT processes.

t_recv: ICP Error: Fixed ICP out-of-phase
This is related to the "Host too slow" message above.

t_recv: Cannot open <program-name> (ICP Program)
The file specified in 'drotconfig' for ICP_PROGRAM is not readable by the DROT.

t_recv: Directory overflow -- messages deleted
The message directory filled up before the message storage file did. The value of 'max_records' in 'drotconfig' is too small.

t_recv: Serial output overflow
This can happen when real-time serial output is enabled and a very slow serial line rate (e.g. 300 baud) is specified.

t_serout: Cannot open <message-file-name>
Serial output task is unable to open the message file.

t_serout: Serial output overflow
Internal buffers in serial output task overflowed. Some DCP messages queued for output may have been dropped. This can happen when many messages are queued and a very slow serial line rate (e.g. 300 baud) is specified.

t_serout: Could not initialize serial port
Invalid parameters were specified for serial port (name, baud, bits per character, parity, stop-bits)
t_serout: Cannot open DCP list file
Serial output task could not open a temporary file queued for transmission.

t_xmitmsg: Cannot allocate buffers
The Non-realtime Functions Task could not allocate memory for internal buffers.

t_xmitmsg: Cannot create tmp file
The Non-realtime could not create a temporary file for queuing messages for transmission. Either the hard disk is full or there is a permissions problem.

t_xmitmsg: Error writing to file
The Non-realtime Functions Task could not create, or write to a temporary file in order to queue DCP messages for transmission.

t_xmitmsg: Error sending on message queue
The Non-realtime Functions Task could not send a serial- output-request message to the serial output task.

APPENDIX E: USING KERMIT PROTOCOL

Kermit protocol is supported on the serial line on both real-time and off-line screens. Kermit protocol is selected on the "Protocol" cycle field of the serial parameters menu.

When serial output is enabled under Kermit protocol, DCP messages are sent as individual files. The file name is the 8-hex-digit DCP address followed by a 3-character sequence extension. The extension ensures that successive messages from the same DCP will not overwrite each other.

Obviously, this could result in a large number of small files being collected on the remote system. It is anticipated that some other process on the remote system will read, process and then delete the DCP message files.

Kermit attempts to lock the serial port by writing a file to the /usr/spool/uucp directory. Make sure that whoever is running Kermit (i.e.'drot') has write permission to this directory.

The DROT assumes that a connection is already in place on the specified serial line and that a Kermit receive process or Kermit server is running on the remote host. The steps for establishing a connection over a phone line are given below.

To establish the connection in various ways may involve enabling or disabling logins on the serial ports. Note that whenever a port is enabled or disabled, it becomes owned by root and its permissions are set to -rw-------. Hence:

```
enable tty1a
chmod 666 /dev/tty1a
```

When real-time serial output is disabled, a HANG-UP signal is sent to the running Kermit process. This may result in the alarm message: "Kermit exit status 1". You may safely disregard this message.
The following steps can be used to establish a 2400 baud phone- line connection between the DROT and another SCO UNIX system for the purpose of transmitting messages via Kermit. To place a copy of Kermit on the remote host, copy the file, /usr/drot/bin/kermit, to a floppy and install it on the remote host. It is assumed that the modem is connected to COM1 on both systems and that /dev/tty1a is enabled for login on the remote system (but not on the DROT).

a. On the DROT, press ALT-F1 and login (if not already) as 'drot'.
b. Type: 'kermit -l/dev/tty1a -b 2400 -i'
c. Type: 'connect'
d. You are now talking to the modem. Issue appropriate AT commands for dialing.
   (e.g. ATDT1,800,555,1212)
e. Login to the remote host over the phone line.
f. Start the Kermit server on the remote host by entering:
   'kermit -l/dev/tty1a -b 2400 -i -x'
g. Now exit from the local Kermit on the DROT by pressing CTRL-\ (backslash) and then C. Then type: 'quit'.
h. Press ALT-F2 for the DROT real-time status screen. Set the serial parameters appropriately (/dev/tty1a,8,n,1,kermit). Then enable real-time serial output.

i. Incoming messages will now be forwarded to the remote host via Kermit.
j. When finished, disable the real-time serial output on the DROT.
k. Press ALT-F1 and restart the local Kermit as in step b.
l. Type: 'finish'
m. Type: 'connect'
n. Log out from the remote system.
o. Press CTRL-\ and then type C. Type 'hangup' and quit.

APPENDIX F: LIST OF ACRONYMS

BCH	Bose, Ray-Chaudhuri, and Hocquengheim (an encoding scheme for DCP addresses)
CGA	Color Graphics Adapter
CRC	Cyclic Redundancy Check
CRT	Cathode Ray Tube (display monitor)
DAPS	DCS Automatic Processing System
DCP	Data Collection Platform
DCS	Data Collection System
DOMSAT	Domestic Satellite
DQM	DOMSAT Quality Monitor
DROT	DOMSAT Receive Only Terminal
EGA	Enhanced Graphics Adapter
EISA	Extended Industry Standard Architecture
GMT	Greenwich Mean Time
GOES	Geostationary Operational Environmental Satellite
HGC	Hercules Graphics Card
ISI	Integral Systems, Inc.
KBPS	Kilobits per second
MB	Megabyte (1,048,576 bytes)
MS-DOS	MicroSoft Disk Operating System
NESDIS	National Environmental Satellite, Data and Information Service
NOAA	National Oceanic and Atmospheric Administration
PC	Personal Computer
RAM	Random Access Memory
SCO	Santa Cruz Operation
TBD	To Be Determined
VGA	Virtual Graphics Array